This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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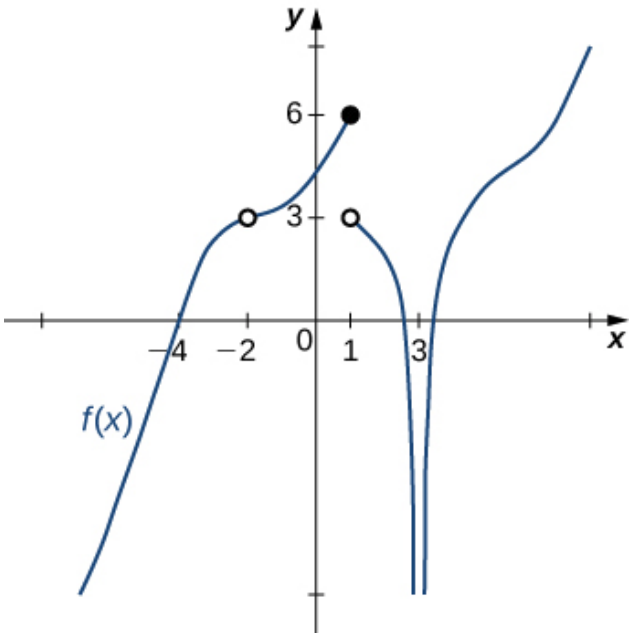
1. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x)$ does not exist.



The solution is 1, which is option B.

A. -2

B. 1

C. 3

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

2. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 7^+} \frac{-5}{(x+7)^4} + 7$$

The solution is $f(7)$, which is option B.

A. ∞

B. $f(7)$

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

3. Evaluate the limit below, if possible.

$$\lim_{x \to 8} \frac{\sqrt{7x-7}-7}{5x-40}$$

The solution is 0.100, which is option B.

A. 0.071

You likely memorized how to solve the similar homework problem and used the same formula here.

B. 0.100

* This is the correct option.

C. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

D. 0.014

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

E. None of the above

If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 8$.

---

4. Evaluate the limit below, if possible.

$$\lim_{x \to 5} \frac{\sqrt{8x-4}-6}{6x-30}$$

The solution is 0.111, which is option B.

A. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

B. 0.111

* This is the correct option.

C. 0.083

You likely memorized how to solve the similar homework problem and used the same formula here.

D. 0.471

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

E. None of the above

If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 5$.

---

5. Based on the information below, which of the following statements is always true?

$$f(x) \text{ approaches } 17.923 \text{ as } x \text{ approaches } 7.$$

The solution is None of the above are always true., which is option E.

A. $f(17)$ is close to or exactly 7

B. $f(7) = 17$

C. $f(7)$ is close to or exactly 17

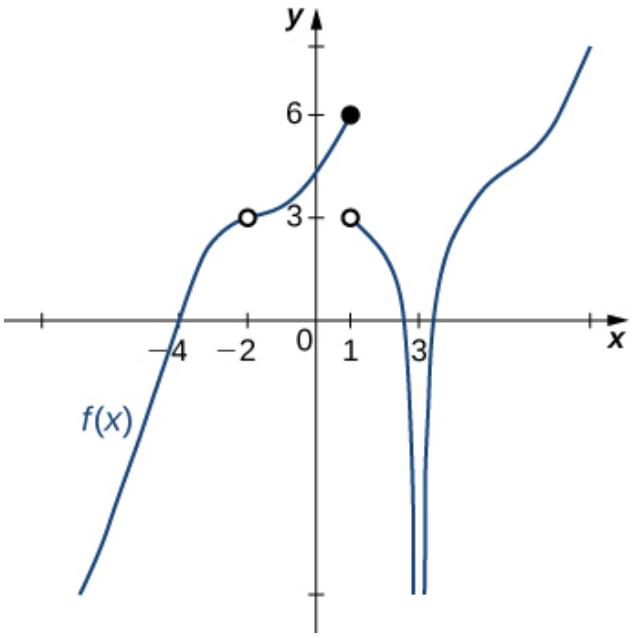
D. $f(17) = 7$

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 7. It says **absolutely nothing** about what is happening exactly at $f(7)$!

---

6. For the graph below, evaluate the limit: $\lim_{x \to -4} f(x)$.



The solution is 0, which is option B.

A. -6

B. 0

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

7. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 1^-} \frac{7}{(x+1)^7} + 8$$

The solution is $f(1)$, which is option A.

A. $f(1)$

B. ∞

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

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8. Based on the information below, which of the following statements is always true?

$$As\ x\ approaches\ \infty,\ f(x)\ approaches\ 9.495.$$

The solution is $f(x)$ is close to or exactly 9.495 when x is large enough., which is option A.

A. $f(x)$ is close to or exactly 9.495 when x is large enough.

B. $f(x)$ is undefined when x is large enough.

C. $f(x)$ is close to or exactly ∞ when x is large enough.

D. x is undefined when $f(x)$ is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach ∞. It says **absolutely nothing** about what is happening exactly at $f(\infty)$!

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9. To estimate the one-sided limit of the function below as x approaches 4 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{4}{x} - 1}{x - 4}$$

The solution is $\{3.9000, 3.9900, 3.9990, 3.9999\}$, which is option D.

A. $\{4.0000, 3.9000, 3.9900, 3.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

B. $\{3.9000, 3.9900, 4.0100, 4.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{4.0000, 4.1000, 4.0100, 4.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

D. $\{3.9000, 3.9900, 3.9990, 3.9999\}$

This is correct!

E. $\{4.1000, 4.0100, 4.0010, 4.0001\}$

These values would estimate the limit of 4 on the right.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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10. To estimate the one-sided limit of the function below as x approaches 4 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{4}{x} - 1}{x - 4}$$

The solution is $\{4.1000, 4.0100, 4.0010, 4.0001\}$, which is option A.

A. $\{4.1000, 4.0100, 4.0010, 4.0001\}$

This is correct!

B. $\{3.9000, 3.9900, 4.0100, 4.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{4.0000, 3.9000, 3.9900, 3.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

D. $\{4.0000, 4.1000, 4.0100, 4.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

E. $\{3.9000, 3.9900, 3.9990, 3.9999\}$

These values would estimate the limit of 4 on the left.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$
